

**SMC-M**  
**INSTRUCTION MANUAL**  
STEPPING MOTOR CONTROLLER



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MODEL SMC-M

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## MODEL SMC-M

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### FEATURES AND SPECIFICATIONS

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#### SMC-M STEPPER MOTOR CONTROLLER

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- \* LED STEP COUNTER DISPLAY
  - \* FORWARD/REVERSE CONTINUOUS RUN
  - \* FORWARD/REVERSE MOMENTARY JOG
  - \* MOTOR SPEED ADJUST
  - \* ROTARY POSITION DIAL -- PRECISE POSITION MOVEMENTS (HALF STEPS)
  - \* 4-PHASE; 5 VOLT; 1-AMP/PHASE; 4, 6, OR 8 WIRE MOTOR CONTROL
  - \* OUTPUT SHORT CIRCUIT PROTECTION
  - \* FULL/HALF STEP SELECTABLE VIA DIP SWITCH
  - \* OVER-TEMPERATURE PROTECTION
  - \* CHOPPER REGULATION OF MOTOR CURRENT
  - \* MOTOR CURRENT DIP SWITCH SELECTABLE FROM 0.5 TO 2.5 AMPS
  - \* MASSIVE HEAT SINK FOR SAFE HIGHER CURRENT HANDLING
  - \* SUPPLY VOLTAGE (INPUT): 28 VAC VIA STEPDOWN TRANSFORMER
  - \* STORAGE TEMPERATURE: -40°C TO +105°C
  - \* OPERATING TEMPERATURE: -20°C TO +85°C
  - \* WEIGHT: 8LBS.
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## SECTION 1

## INTRODUCTION

### *GENERAL DESCRIPTION*

The MODEL SMC-M STEPPER MOTOR CONTROLLER is designed to operate end-mounted stepper motor drives for MDC motion feedthroughs. The SMC-M is a very versatile, powerful, efficient, and compact driver for permanent magnet hybrid stepper motors. Output and motor connections are short-circuit protected. There is also over temperature protection that

switches off the power stages when the junction temperature of active components reach 150° C. If anything goes wrong, the SMC-M will shut itself down until power is removed. When power is restored, operation resumes automatically. The SMC-M is designed to handle higher than normal voltage supply in relation to the voltage required by the motor. This enables the current to be increased quickly and stably. Remember, a stepper motor is a current driven device. Voltage is only useful as a means of getting the current you desire by overcoming the inductance of the motor windings. Therefore, having current controlled output is vital to all stepper motor controllers. The SMC-M employs the time-tested, bipolar chopper regulation of current.

## FUNCTIONAL DESCRIPTION

Figures 1A and 1B depict the SMC-M front and rear panels, respectively.

### FRONT PANEL

#### (1) POSITION

A 4 decade LED step counter display.

#### (2) ZERO

Resets the step counter display to zero.

#### (3) ADJUST

A rotary position dial for precise position movements in HALF or FULL step increments. (Driver selectable).

#### (4) RUN

Allows selection of forward or reverse motor operation in a continuous mode. Once selection is made by closing the switch, the motor will continue to run in the selected direction until the switch is inactivated.

**SECTION 1**  
**CONTINUED**

**(5) JOG SWITCH**

Allows selection of forward and reverse motor operation in a momentary mode. The motor will only continue to run while the switch is held in forward or reverse position.

**(6) SELECT**

Allows the user to select a method of stepping the motor. For precise movements in HALF step increments, the rotary position dial is ideal. For general movement and positioning, use the appropriate JOG or RUN switches. The switch must also be used to activate the optional SMC-1 Indexer.

**(7) SPEED ADJUST**

Enables the user to directly vary motor speed.

**REAR PANEL**

**(8) ON/OFF**

Rocker-type power switch that turns the SMC-M on and off.

**(9) MOTOR**

This 6-pin female-type receptacle allows connection directly to the stepper motor.

**(10) INDEXER**

Standard 9-pin "D" type female connector allows connection to Model SMC-1 Stepper Motor Indexer (optional).

**(11) POWER**

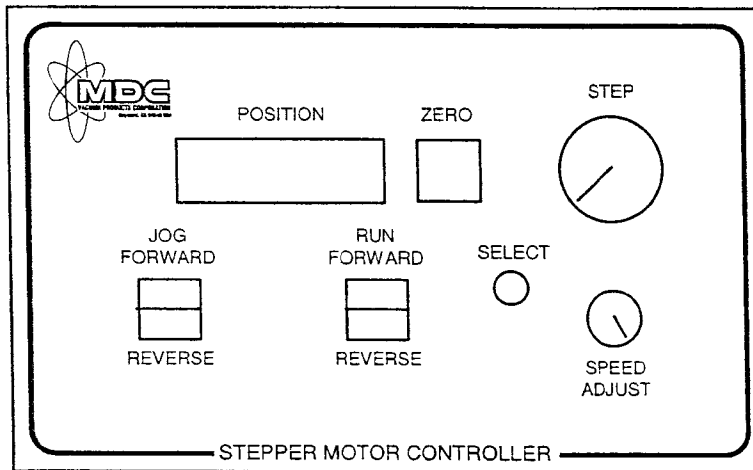
Receptacle for 115 VAC. The SMC-M has been factory configured to operate on a line voltage of 115 VAC.

**(12) FUSE**

Fuse holder for a 1 Amp FUSE.

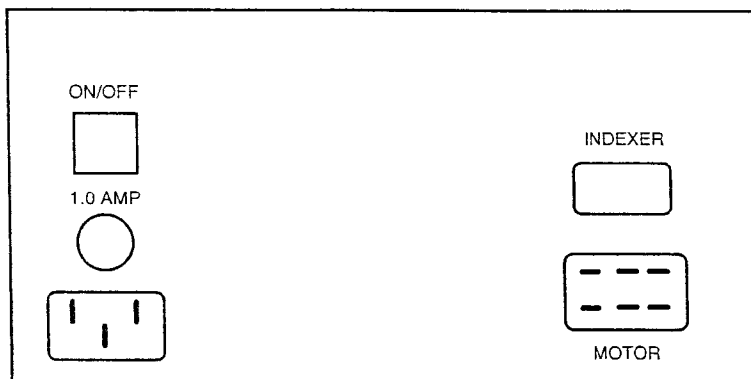
## MODEL SMC-M

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FRONT PANEL DETAIL

FIGURE 1A



REAR PANEL DETAIL

FIGURE 1B

## SECTION 2

### THE CONTROL MODULE

The control module is the very heart and soul of the SMC-M. It houses the power supply, output, motor, and transformer connections, an on-board digital oscillator, dip switches, a protection fuse, and numerous electrical components. *When the SMC-M is opened, electrically "live" components are exposed.*

*Disconnect power or shut off at fuse box/circuit breaker when installing the SMC-M or making adjustments.*

Certain setting adjustments and maintenance procedures on the control module, require the removal of the top enclosure of the SMC-M. Figure 2 depicts the module's key components.

### FUNCTIONAL DESCRIPTION

#### (1) DIP SWITCH

Six dip switch settings allow you to select a motor current setting and designate Full or Half step mode. Positions 1 through 5 sets the desired motor current. (0.5 to 2.5Amps) Position 6 selects Full or Half step. Use Table A for position selections.

**TABLE A**

<u>CURRENT</u>	<u>SWITCH</u>	<u>POSITION</u>
.5A	1,2,3	ON
.55A	1,2	ON
.6A	1	ON
1.2A	2,3	ON
1.4A	2	ON
1.6A	3	ON
2.24A	4	ON
2.4A	5	ON
2.5A	4,5	ON
2.0A	1-5	OFF
<b>HALF/FULL STEP</b>	<b>6</b>	<b>OFF/ON</b>

**NOTE:** Place switch 6 in the HALF or FULL position and leave it. Once most applications are set up, they do not require a change. HALF step provides smooth shaft rotation, reducing motor resonance. Most applications use the HALF step mode. The SMC-M comes factory configured in the HALF step mode.

**SECTION 2**  
**CONTINUED**

**(2) MOTOR CONNECTIONS**

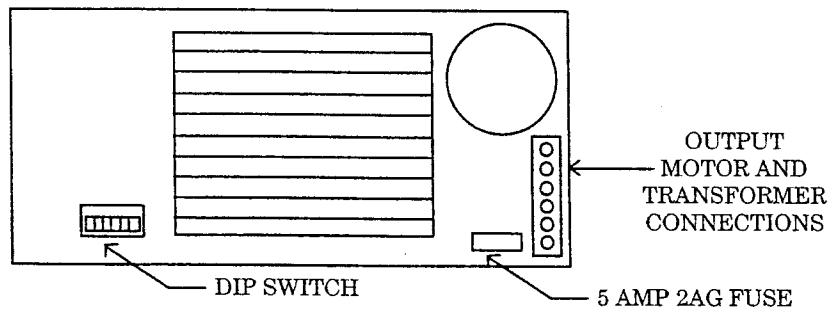
The SMC-M can handle any two-phase permanent magnet hybrid stepping motor with 4, 6, or 8 lead configurations. Try different configurations as well as choosing between series or parallel connections. Of course, your choices are based upon speed and torque requirements and applications. For example, a 6 or 8 lead in series connection provides lower top speed and higher low speed torque. Moreover, an 8 lead in parallel connection produces a higher top speed and a lower torque.

**(3) PROTECTION FUSE**

A 2 AG, 5 Amp slow blow fuse

SMC-M CONTROL  
MODULE DIAGRAM

FIGURE 2





### SECTION 3

When the SMC-M is opened, electrically "live" components are exposed. Be sure the power is disconnected or shut off at the fuse box/circuit breaker.

⊗ *Never try to plug or unplug the SMC-M, connect or disconnect a motor, when the supply voltage is switched on!!* ⊗

#### TROUBLE SHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
MOTOR DOES NOT RUN, POWER APPLIED.	<ol style="list-style-type: none"> <li>1. THERE IS AN ERROR IN THE MOTOR CONNECTION.</li> <li>2. THE LOAD PLUS FRICTION IS TOO HIGH.</li> <li>3. BLOWN FUSE</li> <li>4. THE MOTOR IS DEFECTIVE</li> </ol>	<ol style="list-style-type: none"> <li>1. CHECK AND CORRECT THE MOTOR CONNECTIONS.</li> <li>2. INCREASE THE PHASE CURRENT OR USE A LARGER MOTOR.</li> <li>3. REPLACE FUSE</li> <li>4. REPLACE THE MOTOR</li> </ol>
MOTOR MOVES IRREGULARLY, STALLS, OR WRONG DIRECTION.	<ol style="list-style-type: none"> <li>1. THERE IS AN ERROR IN THE MOTOR CONNECTION.</li> <li>2. THE STEP RATE IS TOO CLOSE TO THE RESONANCE FREQUENCY OR IS TOO HIGH.</li> <li>3. THE LOAD PLUS FRICTION TORQUE IS TOO CLOSE TO THE MOTOR TORQUE.</li> <li>4. THE MOTOR IS DEFECTIVE</li> </ol>	<ol style="list-style-type: none"> <li>1. CHECK AND CORRECT THE MOTOR CONNECTIONS.</li> <li>2. CHANGE THE STEP RATE.</li> <li>3. INCREASE THE PHASE CURRENT OR DECREASE THE STEP RATE.</li> <li>4. REPLACE THE MOTOR.</li> </ol>
REPEATED FUSE BLOWING.	<ol style="list-style-type: none"> <li>1. OVERLOADED CONDITION</li> <li>2. LOOSE CONNECTIONS.</li> <li>3. THE MOTOR IS DEFECTIVE</li> <li>4. DEFECTIVE CONTROL.</li> </ol>	<ol style="list-style-type: none"> <li>1. SEE OUTPUT OVERLOAD CONDITION.</li> <li>2. CHECK ALL CONNECTIONS.</li> <li>3. REPLACE THE MOTOR.</li> <li>4. CONSULT FACTORY.</li> </ol>
INCORRECT VOLTAGE SUPPLY	<ol style="list-style-type: none"> <li>1. THE POWER SUPPLY VOLTAGE IS TOO HIGH, OR TOO LOW, OR A POWER SUPPLY FAULT HAS OCCURRED.</li> <li>2. THE MOTOR IS ACTING LIKE A GENERATOR</li> <li>3. VERY FAST DECELERATION IS USED</li> </ol>	<ol style="list-style-type: none"> <li>1. CORRECTLY SET THE POWER SUPPLY VOLTAGE.</li> <li>2. REDUCE SYSTEM INERTIA</li> <li>3. USE LONGER DECELERATION TIMES.</li> </ol>
OUTPUT OVERLOAD CONDITION	<ol style="list-style-type: none"> <li>1. AN ACCIDENTAL SHORT CIRCUIT PHASE-TO-PHASE OR PHASE-TO-SUPPLY HAS OCCURRED..</li> <li>2. THE MOTOR HAS AN INTERNAL SHORT.</li> </ol>	<ol style="list-style-type: none"> <li>1. CHECK CONNECTIONS BETWEEN SYSTEM AND MOTOR.</li> <li>2. REPLACE THE MOTOR.</li> </ol>

